

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 43-47, 49-52, 54 and 56-84 are in the case.

I. ELECTION/RESTRICTION

The election of Group I (claims 43-62) is affirmed. It is noted that claims 63-84 are withdrawn from further consideration.

II. THE FORMAL REJECTION

Claim 52 stands rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite on the ground that the claim recites the limitation "component Y" for which there is allegedly insufficient antecedent basis. In response, claim 43 has been amended to make reference to component Y.

Claim 54 (first iteration) (the second iteration of claim 54 has been canceled without prejudice) stands rejected on the ground that it recites the limitation "f (a certain component's gram atom ratio), for which there is allegedly insufficient antecedent basis. In response, claim 43 has been amended to make reference to the limitation "f".

Withdrawal of the formal rejection is respectfully requested.

III. THE ANTICIPATION/OBVIOUSNESS REJECTIONS

Claims 43-58 and 60-62 stand rejected under 35 U.S.C. §102(a) as allegedly anticipated by Komada *et al.*, Pre-grant Publication No. US 2003/0088118 ("Komada"). The rejection is respectfully traversed.

Amended claim 43 claims a catalyst composition suitable for the oxidation of ethane, and optionally ethylene, to acetic acid and ethylene. The catalyst composition consists of the elements molybdenum, vanadium and niobium, optionally tungsten and a component Z and optionally component Y, in combination with oxygen, wherein a, b, c, d, e and f represent the gram atom ratios of the elements Mo, W, Z, V, Nb and Y respectively, such that:

$$0 < a \leq 1; 0 \leq b < 1 \text{ and } a + b = 1;$$

$$0.05 < c \leq 2;$$

$$0 < d \leq 2;$$

$$0 < e \leq 1; \text{ and}$$

$$0 \leq f \leq 2;$$

wherein Z is selected from one or more of Ge, Sn and Pb, and Y is selected from one or more of Cr, Mn, Ta, B, Al, Ga, In, Pt, Zn, Cd, Bi, Ce, Co, Rh, Ir, Cu, Ag, Fe, Ru, Os, K, Rb, Cs, Mg, Ca, Sr, Ba, Ni, P, Si, Ti, U, Re, La, Ti, Hf and Zr, and further wherein the elements are supported on a support.

From the above definitions, it will be seen that component Z is present in a gram atom ratio of between greater than 0.05 and 2 and is one or more of Ge, Sn and Pb. Component Y is present in a gram atom ratio of between greater than or equal to zero and less than or equal to 2 and is selected from one or more of Cr, Mn, Ta, B, Al, Ga, In, Pt, Zn, Cd, Bi, Ce, Co, Rh, Ir, Cu, Ag, Fe, Ru, Os, K, Rb, Cs, Mg, Ca, Sr, Ba, Ni, P, Si, Ti, U, Re, La, Ti, Hf and Zr.

Komada relates to an oxide catalyst for use in the catalytic oxidation or ammoxidation of propane or isobutene. The catalyst has the formula

$\text{Mo}_1\text{V}_a\text{Nb}_b\text{X}_c\text{Y}_d\text{Z}_e\text{Q}_f\text{O}_n$ (wherein X is at least one element selected Te and Sb; Y is at

least one element selected from Al and W; Z is at least one element selected from elements which individually form an oxide having a rutile structure and a Z oxide having a rutile structure is used as a source of Z for producing the catalyst; Q is at least one element selected from Ti, Sn, Ge, Pb, Ta, Ru, Re, Rh, Ir, Pt, Cr, Mn, Tc, Os, Fe, As, Ce, Co, Mg, Ni and Zn, and a Q compound not having a rutile structure is used as a source of Q for producing the catalyst; and a, b, c, d, e, f and n are, respectively, the atomic ratios of V, Nb, X, Y, Z, Q and O, relative to Mo).

Of the catalysts exemplified in Komada, those which contain Mo, V, Nb and one or more of Ge, Sn or Pb in the amounts required by the presently claimed invention, also contain Sb. The language "consists of" now employed in amended claim 43 requires that the catalyst composition contains oxygen, Mo, V, Nb, Z, optionally W and optionally Y and nothing further, i.e., the presence of any other element in the catalyst composition is excluded. Since the presence of Sb in the catalyst composition of amended claim 43 is excluded, the invention as claimed is not anticipated by Komada. Withdrawal of the anticipation rejection based on that reference is respectfully requested.

Claims 43-46 and 48-62 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by McCain *et al.*, European Publication No. EP 0294846 (McCain-EP) or, in the alternative, under 35 U.S.C. §103(a) as allegedly unpatentable over McCain-EP. The rejections are respectfully traversed.

McCain relates to a process for the production of an organic acid by the catalytic oxidation of an alcohol using a catalyst of the composition $Mo_xV_yZ_z$ wherein Z can be nothing, or one or more of Li, Na, Be, Mg, Ca, Sr, Ba, Zn, Cd, Hg, Sc, Y, La, Ce, Al, Ti,

Ti, Zr, Hf, Pb, Nb, Ta, As, Sb, Bi, Cr, W, U, Ta, Fe, Co and Ni, which catalyst may be used with a support.

Of the catalysts exemplified in McCain-EP, none contain the presently claimed combination of Mo, V, Nb, at least one of Ge, Sn or Pb, and oxygen. In particular, the catalyst employed in Examples 1 and 2 of McCain-EP does not contain at least one of Ge, Sn or Pb. In addition, this catalyst comprises Sb which is now excluded from the claimed catalyst composition of the present invention. The "intimate mixture" of MoVNbO_x and SnMoO_y employed in Examples 3 and 4 of McCain-EP is a mixture of two distinct catalyst compositions, which are separately prepared and calcined, and not a single catalyst composition. Neither of these two distinct catalyst compositions consists of at least Mo, V, Nb and component Z in combination with oxygen. The catalyst employed in Examples 5 and 6 of McCain-EP neither contains Nb, nor at least one of Ge, Sn or Pb.

Based on the above, it is clear that the invention as claimed is not anticipated by McCain-EP (the obviousness aspect of the rejection is discussed below). Withdrawal of the anticipation rejection based on that reference is respectfully requested.

Claims 43-62 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Young *et al.*, U.S. Patent No. 4,250,346 (1981) (Young) or, in the alternative, under 35 U.S.C. §103(a) as allegedly unpatentable over Young. The rejection is respectfully traversed.

Young relates to the gas phase catalytic dehydrogenation of ethane to ethylene in the presence of oxygen using a catalyst of the composition $\text{Mo}_a\text{X}_c\text{Y}_c$ wherein X is Cr,

Mn, Nb, Ta, Ti, V and/or W, and Y is Bi, Ce, Co, Cu, Fe, K, Mg, Ni, P, Pb, Sb, Si, Sn, Ti and/or U, which catalyst may be used on a support.

Of the catalysts exemplified in Young, none contains the required combination of Mo, V, Nb, at least one of Ge, Sn or Pb, and oxygen. In fact, in each of Examples 1 to 58, the catalyst composition lacks one or more of these presently claimed elements. The presently invention is clearly not anticipated by Young (the obviousness aspect of the rejection is discussed below). Withdrawal of the anticipation rejection based on that reference is respectfully requested.

Claims 43-59 and 62 stand rejected under 35 U.S.C. §102(a) as allegedly anticipated by Ellis, WIPO Publication No. WO 03/033138 (Ellis) or, in the alternative, under 35 U.S.C. §103(a) as allegedly unpatentable over Ellis. The rejection is respectfully traversed.

Ellis relates to a catalyst composition for the selective oxidation of ethane and/or ethylene to acetic acid. The catalyst composition comprises elements, Mo, Nb, V, Au, optionally W, in the absence of palladium, and component Z, selected from B, Al, Ga, In, Ge, Sn, Pb, Sb, Cu, Pt, Ag, Fe and Re. None of the catalysts exemplified in Ellis comprises at least one of Ge, Sn and Pb in the claimed gram atom ratio of greater than 0.05 to 2. Further, the catalyst composition of Ellis requires the presence of gold. As discussed above, the language "consists of" employed in amended claim 43 means that the presence of any element other than Mo, V, Nb, Z, optionally W and optionally Y in the catalyst composition is excluded. Since the presence of gold in the catalyst composition of the present invention is excluded, the presently claimed invention is not anticipated by Ellis (the obviousness aspect of the rejection is discussed below).

Withdrawal of the anticipation rejection based on that reference is respectfully requested.

The Action asserts that the present invention is rendered unpatentable in view of the cited art. This is not correct.

The problem addressed by the present invention is to provide a catalyst composition for the oxidation of ethane, and optionally ethylene, to acetic acid and ethylene with high overall selectivity to acetic acid and ethylene and a reduced molar ratio of ethylene to acetic acid (see, page 3, lines 10-12). It has been found by the present inventors, surprisingly, that improved selectivity to acid and ethylene can be achieved by incorporating one or more of Ge, Sn or Pb, at a relative molar ratio of between greater than 0.05 and 2, in a catalyst additionally consisting of Mo, V, Nb, optionally W and optionally Y (see, page 3, lines 13-18). Furthermore, it has been found by the present inventors that by using the catalyst composition of the present invention, the ratio of acetic acid and ethylene produced may be approximately 1:1 (see, page 3, lines 19-21). In addition, high overall selectivity may be achieved in the substantial absence of noble metals such as gold and/or palladium in the catalyst composition (see, page 3, lines 22-23).

Komada relates to catalysts for the production of unsaturated carboxylic acids and unsaturated nitriles. Komada does not disclose or suggest that the inclusion of one or more of Ge, Sn or Pb in a catalyst additionally consisting of Mo, V, Nb, optionally W, optionally Y and nothing further would enable improved selectivity to acetic acid and ethylene and reduced molar ratio of ethylene to acetic acid in the oxidation of ethane,

and optionally ethylene. One of ordinary skill would not therefore have been motivated to arrive at the presently claimed invention based on Komada.

McCain-EP relates to a process for the production of an organic acid by the catalytic oxidation of an alcohol. McCain-EP does not relate to the oxidation of ethane, and optionally ethylene to acetic acid and ethylene. Thus, one of ordinary skill would have had no motivation to consult McCain-EP when seeking a solution to above-described problem.

Furthermore, there is nothing in McCain-EP which suggests that the inclusion of one or more of Ge, Sn or Pb in a catalyst additionally consisting of Mo, V, Nb, optionally W and optionally Y would enable improved selectivity to acetic acid and ethylene and reduced molar ratio of ethylene to acetic acid in the oxidation of ethane, and optionally ethylene. One of ordinary skill would not therefore have been motivated to arrive at the presently claimed invention based on McCain-EP.

Young is concerned with a process whereby ethane can be oxydehydrogenated to ethylene at relatively low temperatures with relatively high levels of conversion, selectivity and productivity. Nothing in Young suggests that the inclusion of one or more of Ge, Sn or Pb in a catalyst additionally consisting of Mo, V, Nb, optionally W and optionally Y would enable improved selectivity to acetic acid and ethylene and reduced molar ratio of ethylene to acetic acid in the oxidation of ethane, and optionally ethylene. One of ordinary skill would not therefore have been motivated to arrive at the presently claimed invention based on Young.

Ellis requires the presence of gold in the catalyst composition. Since the presence of gold is excluded in the catalyst composition of the present invention, Ellis

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leads away from the presently claimed invention. One of ordinary skill would not therefore have been motivated to arrive at the presently claimed invention based on Ellis.

The presently claimed invention is therefore not suggested by any one of Komada, McCain-EP, Young and/or Ellis. Withdrawal of the obviousness rejections based on those references is accordingly respectfully requested.

IV. AMENDMENTS

Claim 43 has been amended to recite that the catalyst composition "consists of" the elements Mo, V, Nb, optionally W, component Z and optionally component Y, in combination with oxygen, wherein Z is selected from Ge, Sn and Pb, and Y is selected from one or more of Cr, Mn, Ta, B, Al, Ga, In, Pt, Zn, Cd, Bi, Ce, Co, Rh, Ir, Cu, Ag, Fe, Ru, Os, K, Rb, Cs, Mg, Ca, Sr, Ba, Ni, P, Si, Ti, U, Re, La, Hf and Zr, the elements being supported on a support. The dependency of claim 49 has been amended to be dependent on claim 43. Claims 48, 53, 54 (second iteration) and 55 have been deleted without prejudice. The term "metal oxide" has been deleted from claims 57 and 58, and the dependency of claim 58 has been amended to be dependent on claim 43. No new matter is entered.

Favorable action is awaited.

BRAZDIL et al
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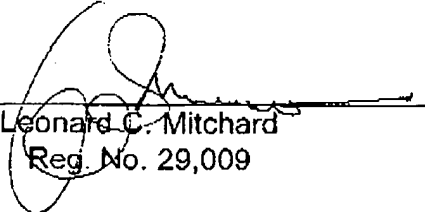
NIXON VANDERHYE PC Fax 703+816+4100

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Respectfully submitted,

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